

under the auspices of Union College, Schenectady, N.Y. (in advance of vol. ix. of the *Transactions* of the Albany Institute, pp. 1-72, plates 1-11). The locality was on the eastern shores of Virginia (Northampton); between the mainland and the islands a large area of dark mud is exposed at low water. It is described as abounding in animal life, and yet the number of species of Annelids described is not large, there being only fifty-nine, relegated to forty-nine genera; of these, four of the genera are new, and twenty-seven of the species. The absence of Mediterranean species seems noteworthy, scarcely any of Ehler's species from the Adriatic or Claparède's, from the Bay of Naples, being quoted.

ACID REACTION OF FLOWERS.—It was stated, as the result of observation, by MM. Fremy and Clöez, that the juices of all red and rose-red flowers showed an acid reaction, whereas the juices of blue flowers were always neutral, or even weakly alkaline. The subject has been studied afresh by Herr Vogel, who examined 100 species, viz., 39 blue, 44 red, 6 violet, 8 yellow, and 3 white flowers. The experiments (described to the Munich Academy) confirm the view that it is not warrantable to attribute the red colouring of flowers to action of acids or acid salts on blue colouring matter, or to attribute the latter to the influence of alkalis on red colouring matter, though doubtless there is a certain relationship between certain red and blue plant colours. It further appears that the opinion that plant juices generally, and even the majority of flower-juices, have an acid reaction, is pretty correct; among 100 flowers there were only twelve which did not react acidly. On the other hand, the rule above referred to is not found to apply universally, for among thirty-eight blue flowers twenty-eight showed a decidedly acid reaction, though the degree of the acidity was less than in red flowers.

FUNCTION OF SOME CONTRACTILE VACUOLES IN INFUSORIA.—An observation recently published by Herr Engelmann, of Utrecht, throws light on the function of the contractile vacuole in some infusoria. Some time ago he found a new infusory animal, closely allied to *Chilodon cucullulus*, and which he calls *Chilodon propellens*; it is marked by its slender form, and by the round shape of its hinder extremity, where is the contractile vesicle. This animal swims with pretty constant, but very slow, velocity in circling paths. Each time the vacuole contracts (which occurs in pretty regular intervals of about half a minute, and very quickly) there is an impulsive acceleration of the forward motion. If the animal be at rest, it makes, at the moment of systole, an impulsive forward movement about a quarter of its length. No simultaneous acceleration of the very sluggish ciliary movement was observed. The forward motion, then, can only be attributed to the backward thrust of liquid expelled from the contractile vacuole. Herewith agrees the fact that the hinder portion of the body shrinks together, in systole, as though to a thin empty sack folded in longitudinal direction, without the least perceptible increase in volume of the forepart of the body; so that the greater part, if not the whole of the liquid contents of the vacuole, must have been ejected behind. The re-expansion of the vacuole takes place very slowly, and it could not be determined whether liquid was directly drawn in from without. Coloured liquids were never observed to enter the vacuole.

PHYSIOLOGICAL ACTION OF COPPER.—For some years past the majority of medical men have no longer considered salts of copper as true poisons, their innocuousness being partly due to the fact that when they are taken in any considerable quantity, they cannot be kept in the stomach, but produce vomiting. It remained to ascertain whether, in animals incapable of vomiting, salts of copper would act as poison. At a recent meeting of the Société de Biologie, M. Gallipe described some experi-

ments on the subject. He had given several rabbits copper with their food. One of these animals received daily, for six months, two grammes of acetate of copper. At the end of this period, the rabbit showed considerable fattening. Its liver weighed 70 grammes, and contained 13 centigrammes of copper. Further, this rabbit was eaten by the experimenters, who were no way incommoded thereby. This is one fact more (says *La Nature*) in favour of the so-called rehabilitation of copper.

LOCALISATION OF ARSENIC IN THE BRAIN.—Experiments have recently been made on guinea pigs by M. De Poncy and Livon (*Comptes Rendus*), with reference to the localisation of arsenic in the brain, when arsenious acid was given in small doses daily with the food. They found that phosphoric acid increased considerably in the urine, and it can only have come (the authors point out) from an elimination by substitution, not from a pathological state of the animal, for in cerebral affections, rather a diminution than an increase of phosphoric acid in the urine has been observed. The arsenic, then, seems to replace the phosphorus of phosphoglyceric acid in lecithine, producing arsenioglyceric acid. The authors are seeking to isolate this new base.

NOTES

PROF. CHRYSTAL of St. Andrews (formerly of Peterhouse, Cambridge) has been appointed to the Chair of Mathematics in Edinburgh University. He was Second Wrangler and Second Smith's Prizeman in 1875, and is already known to science by his experimental researches on Ohm's Law (made in the Cavendish Laboratory) and by the very excellent article "Electricity" in the new edition of the *Encyclopædia Britannica*. Among the eleven candidates for the chair there were four Senior Wranglers. Thus the Chair of Mathematics in St. Andrews is now vacant; and it has just been announced that Prof. Blackburn has requested the University Court of Glasgow to sanction his retirement from the Chair of Mathematics there. As Prof. Fuller of Aberdeen resigned last year only, the whole of the Mathematical Chairs in Scotland have been vacant within one year.

At the half-yearly general meeting of the Scottish Meteorological Society, held on Monday, July 21, papers were read on "The Cold Weather since November, compared with Periods of Protracted Cold in Scotland from 1764," by Alexander Buchan; on "The Great Plague of London in Relation to Weather," by Dr. Arthur Mitchell; and on "Ground Swells observed in Scotland since 1868," by Alexander Buchan. With reference to the proposal of General Myer to publish maps exhibiting the simultaneous monthly means in meteorology of the whole of the northern hemisphere, intimated in *NATURE*, vol. xx. p. 275, the Scottish Meteorologists state, in their Report to the meeting, their conviction "that this truly cosmopolitan work, which the United States alone are in a position to undertake, thanks to the enterprise and liberality of their Government, will bring before us, month by month, the general circulation of the earth's atmosphere, and raise at least, if not satisfy, many inquiries lying at the very root of meteorology, and intimately affecting those atmospheric changes which meteorologists hitherto have been recording."

WE have already referred to the valuable "Bibliographical Contributions" issued by the library of Harvard University and edited by Mr. Justin Winsor, the librarian. One of the most scientifically important of these is a list of apparatus available for scientific researches involving accurate measurements, prepared by means of answers to a circular sent out by Professors Wolcott Gibbs, E. C. Pickering, and Trowbridge, of Harvard. This circular speaks of the cost of the apparatus required for exact quantitative determinations in the various branches of

physics, as always having been a serious obstacle to the prosecution of investigations requiring a high degree of precision. It asks, therefore, from the various institutions addressed, a list of such apparatus of this kind as they possess, and which they are willing to place, under certain restrictions, at the disposal of any properly qualified persons for the purpose of investigation. The principal scientific institutions of the State have responded, and the lists they give convey a highly favourable idea of the completeness and high quality of the apparatus of precision with which American laboratories are furnished. Among the institutions thus prepared to place their equipments at the service of science are the United States Coast Survey, the Academy of Arts and Sciences, the various scientific departments of Harvard University, the Stevens Institute of Technology, Massachusetts Institute of Technology, Columbia College, New York, and the Johns Hopkins University, which, though the youngest of these institutions, has an admirably complete scientific equipment. Mr. Winsor is to be congratulated on the wide extension he has given to the significance of the term bibliography, and on the service he is doing science in the United States.

From the *Chemical News* we learn that a newly-discovered metal, Norvegium, has been detected and isolated by Dr. Tellef Dahll in a sample of copper-nickel from Kragerö, in Skjærgaarden. The colour of the pure metal is white, with a slight brownish cast. When polished it has a perfectly metallic lustre, but after a time it becomes covered with a thin film of oxide. It can be flattened out in an agate mortar, and in hardness it resembles copper. The melting-point is 350°C ., and the specific gravity 9.441. Its equivalent appears to be 145.9. Only one oxide, NgO , has been obtained. With sulphuretted hydrogen it gives a brown sulphide, even in strongly acid hydrochloric solutions, which redissolves in ammonium sulphide. With a slight addition of potassium ferrocyanide it gives a brown, but with larger proportions a green precipitate. The sulphuric solution is turned brown on the addition of zinc, and the metal is deposited in a pulverulent state. The solutions of this metal are blue, but become greenish on dilution.

THE cranium of Descartes is often adduced as an exception to the general rule that a great mind requires a large brain. This statement seems to have rested on no exact measurement, and Dr. Le Bon resolved recently to test its accuracy. The result is that he finds the cubic capacity of Descartes' skull to be 1,700 centimetres, or 150 centimetres above the mean of Parisian crania of the present time. At the same time Dr. Bordier has recently found the average capacity of the skulls of thirty-six guillotined murderers to be 1,547.91 c.c., the largest reaching the high figure of 2,076 c.c.

THE Paris International Exhibition of Sciences applied to Industry will be opened to-day. It is divided into eleven groups. The first group contains prehistoric subjects, anthropology, sociology, and education. The eight following groups are respectively applications of physics, of chemistry, of mechanics, mechanics applied to locomotion, application of the natural sciences, mathematical sciences, the applications of geology, books, and manuscripts. The tenth group will contain (1) The artificial reproduction of a glacier with an interior grotto, which will show the several geological strata containing characteristic fossils. (2) The reproduction on a large scale of a civilised house of the nineteenth century, a hut of savages, and a prehistoric habitation. (3) A map of Europe in the tertiary period executed in relief. (4) A dioramic view of the actual site of Paris during that period. (5) Another dioramic view just before the time when man made his first appearance on the earth. Group 11 will be devoted to a retrospective exhibition of objects belonging to art and industry. The most notable innovation will be the creation of a commission of scientific inquiry

to obtain information from exhibitors, which will be published with a commentary from the commission. The commission of patronage is composed of MM. Carnot, Dr. Henry Lionville, Henry Martin, Charles Blanc, &c. The works are progressing with great activity, and are lighted by the electric light on the Jablochhoff system, which will illuminate the Exhibition at night.

WE are requested to state that at the Sheffield meeting of the British Association there will be an important exhibition of scientific apparatus and specimens, both in the temporary museum and at one of the *soirées*. Inventors and others who may have objects of interest to exhibit are desired to at once communicate with the local secretaries, Sheffield, as this will be an unusually favourable opportunity for bringing their discoveries before the scientific world.

AT the recent meeting, already referred to by us, of ladies and gentlemen interested in Japanese art, literature, folk-lore, &c., at the rooms of the Royal Asiatic Society, a committee was appointed to consider the best mode of giving effect to that object in communication with the Council of the Royal Asiatic Society. Among the Committee are—Sir Rutherford Alcock, K.C.B., Sir Charles Wentworth Dilke, Bart., M.P., Prof. Robert K. Douglas, Major Gen. A. Lane Fox, F.R.S., E. J. Reed, C.B., M.P., F.R.S., E. B. Tylor, LL.D., F.R.S. At a meeting of this Committee on the 11th inst. it was resolved that for the objects in view a Society should be formed, to be called the "Nippon (Japan) Institute," to consist of members subscribing a sum of 10s. per annum, and that the permission of the Council of the Royal Asiatic Society be asked to allow such Society to hold meetings at their rooms, 22, Albemarle Street. It was also resolved that a Committee be appointed to act, with Mr. Pfoundes as Secretary, in the organisation of such Society, and to conduct the necessary correspondence. On this Committee, besides others, are those whose names are given above. It is proposed that the institution shall consist of a Central Institution; a President; Council; General Committee; Councils of Division, *e.g.*, Antiquities, Art, Anthropology, Folk-lore, Geography, History, Language, Literature, &c., and Committees of Sections; a Chief Branch in Tokio, Japan; Branches in Japan, China, India, Australia and other Colonies, United States and other parts of America, Continent of Europe, Provincial Towns of Great Britain, &c.; in Correspondence with Central Institution; Corresponding Members where no branches exist. The Society is to encourage and reply to inquiry; to solicit literary and scientific ladies and gentlemen to suggest subjects for inquiry and collection of material; to arrange lectures, *soirées*, *conversaciones*, exhibitions, social reunions, and parties to view collections, &c.; and otherwise keep alive the public interest in Japanese topics, &c.

THE "Naturforschende Gesellschaft" of Halle will celebrate the 100th anniversary of its foundation on the 30th instant.

THE death, on July 5, is announced of Dr. Reiff, of Tübingen, formerly Professor of Philosophy at the University of that city.

A NEW natural history museum, formerly the private collection of Dr. L. W. Schaufuss, has just been opened to the public at Blasewitz, near Dresden. Dr. Schaufuss has for many years been in close personal relations with the Archduke Ludwig Salvator, of Austria, well known by his scientific writings and travels, and the new museum therefore bears the name of its founder's august friend and patron. Besides numerous natural history objects it also contains others of anthropological and ethnological interest.

A CORRESPONDENT asks if there is any flora of Cape Colony published? and if there is any book which would be useful in the practical study of the Cape flora? In reply we may state that three volumes have been published of Harvey and Sonder's "*Flora Capensis*" (Lovell Reeve). We understand Mr. Dyer

is engaged upon a continuation of it, the fourth volume being now in progress. For a general review of the flora see Harvey's "Genera of South African Plants," edited by Hooker (Reeve); Harvey's "*Thesaurus Capensis*" may sometimes be procured secondhand.

A LARGE number of mammalian bones of the diluvian period have lately been obtained from the bone-cave of Vypustek, Moravia (Prof. K. Th. Liebe, *Procead. Imp. Acad. Vienna*, May 23, 1879), and sent to the Imperial Museum at Vienna. The comparison of these remains with those from the Thuringian caves is important, especially with those from the cave of Lindenthal near Gera, which led Liebe and Nehring to the interesting conclusion that all this region was an extensive barren steppe, without any forest vegetation, at the beginning of the Second Diluvial Period. In the cave of Vypustek are found—*Lynx vulgaris*, *Felis catus*, *Canis spelæus*, *C. familiaris*, *Vulpes vulgaris*, *V. lagopus*, *Gulo borealis*, *Martes abietinus*, *Putorius putorius*, *F. erminea*, *Vesperugo serotinus*, *Arvicola amphibius*, *A. sp.*, *Lepus variabilis* (*timidus* ?), *Cricetus frumentarius*, *Myoxos glis*, and *Sciurus vulgaris*. Besides these seventeen species, von Hochstetter found remains of *Elephas primigenius*, *Rhinoceros tichorhinus*, *Equus fossilis*, *Bos priscus*, *Cervus tarandus*, *C. elaphus*, *C. capreolus*, *C. euryceros* (?), *Capra ibex*, *Ursus spelæus*, *Felis spelæa*, and *Hyæna spelæa*; the number of species found in the Vypustek Cave being therefore twenty-nine. The evidence proves that this cave was a den of beasts of prey, long tenanted by families of hyenas and bears, and occasionally visited by lions, lynxes, and wolves; while many side galleries, some opening to day, gave shelter to martens, weasels, and other small carnivores. Some few animals may have been carried into the cave after death by streams and floods; but by far the greater part of the remains are those of tenants of the cave, or of their prey brought in for food. The fauna of this cave indeed bears a decidedly sylvestrian character; and it may be admitted that its environs were covered with woods, and had a forest climate, at the time when northern and middle Germany had the features and climate of a steppe. Hence too the mountains and hills of South Bohemia and Moravia may be supposed to have been the centre from which forests advanced gradually in every direction over the great Diluvial Steppe of Europe north of the Alpine chain. Further explorations, to be conducted by the Prehistoric Commission of the Imperial Academy of Vienna, may lead to further interesting facts as to the relative depth and succession of the animal remains in this cave.

GREAT damage to agriculture has been done by swarms of grasshoppers in Hungary, in the Szathmar Comitatus. An area of some 600 Hungarian "Joch" is entirely devastated. The local authorities have been compelled to apply to Budapest for military assistance, besides availing themselves of that of the inhabitants of numerous villages in the districts affected by the plague.

ON July 1 a monthly serial, entitled *Der Phonograph*, appeared at Vienna, edited by Wilhelm Stockinger, and having for its object the cultivation and propagation of Faulmann's "phonography."

IN this month's number of the *Mineralogical Magazine* is the history of a remarkable gem, called the "Maxwell-Stuart" topaz, which is undoubtedly the largest cut precious stone known. Its weight is 1,475.9 grains, or 368 carats 3.9 grains; specific gravity, 3.5685. It is perfectly white and very brilliant. It was brought from Ceylon many years ago, and has been for a considerable time, in an uncut state, in the possession of Mr. Maxwell-Stuart, a collector of gems, after whom it takes its name. An idea of its size may be formed by stating that the table is 2½ inches in length. It was cut and polished in London, under the supervision of Mr. Bryce-Wright, the present owner, the operations occupying twenty-eight days.

MR. MORRIS, the well-known botanist in Ceylon, whose endeavours to find a remedy for the disastrous coffee-leaf disease we have before referred to, has established the fact that very favourable results may be obtained from the application by hand of a mixture composed of three parts of lime and one of sulphur.

THE officers of the French Balloon Committee tried several ascents last week, in order to determine the visibility of terrestrial objects at various altitudes.

AT a recent meeting of the French Physical Society M. Bouty described the action of heat on metallised thermometers. The contraction produced at the moment of deposit of the metal is entirely compensated by the difference of the dilatations of the glass and the metallic envelope, at a temperature which is higher the greater the contraction, and the smaller the difference of the dilatations, but independent of the thickness of the deposit. Above this critical temperature traction takes the place of pressure on the bulb; ruptures presently occur at the surface of contact, and the result is permanent deformations, which produce a new displacement of zero. This latter effect is never produced when the critical temperature is not exceeded. A metallised thermometer may be used to measure temperatures, if it have been compared with a typical thermometer, from which it does not differ sensibly unless the metallic deposit be of considerable thickness. When sulphate of copper is electrolysed between two very sensitive thermometers, coated with copper superficially, the thermometer attached to the positive pole is found to be at a temperature superior, the negative thermometer at a temperature inferior, to that of the surrounding liquid. The same phenomenon is observed in electrolysing sulphate of zinc between two thermometers covered with zinc. M. Bouty recalled the fact that when two plates of zinc or of copper are kept at different temperatures in the corresponding sulphate, a current arises, and the warmer metal is the positive pole. There is between the production of these currents and the phenomena studied by M. Bouty a relation of reversibility similar to that which connects Peltier's phenomenon and ordinary thermo-electric currents.

THE electro-magnetic rotation of the plane of polarisation of light in gases has recently been proved and studied variously by Kundt and Röntgen, Bichat and H. Becquerel. The last-named observer, by a superior method, measured the phenomenon especially in ordinary coal gas, while the others demonstrated the rotation in sulphide of carbon vapour, gaseous sulphurous acid, and sulphuretted hydrogen. In a paper to the Vienna Academy, Prof. Lippich, of Prague, describes additional experiments on the subject. He aimed especially at perfecting the optical part of the apparatus, and attained remarkable accuracy. He succeeded in demonstrating the rotation *in air*, using a large coil 0.5 metres long, with 365 m. length of copper wire (nearly 3 mm. thick) in twelve layers. The current was from sixty average Bunsen elements, combined in a battery of thirty double elements. The light-ray was simply sent through the hollow part of the coil. Under these circumstances an unmistakable electro-magnetic rotation was observed, and it was in the direction of the current coursing round the air. The angle of rotation could not have been far from 6 to 10 seconds of arc. (An exact determination was not possible, owing to the provisional arrangement of the optical apparatus.)

THE last number of the *Journal* of the Society of Arts contains two elaborate papers by Mr. A. T. Atchison and Mr. W. H. Penning, giving suggestions for dividing England and Wales into watershed districts, with reference to the National Water Supply.

THE *Sanitary Record* is now appearing in an enlarged form as a monthly, instead of a weekly as hitherto.

THE additions to the Zoological Society's Gardens during the past week include a Lesser White-nosed Monkey (*Cercopithecus petaurista*) from West Africa, presented by Mr. Robt. F. Clothier; two Ring-tailed Lemurs (*Lemur catta*) from Madagascar, presented by Mr. Hugh McCubbin; a European Bearded Vulture (*Gypaetus barbatus*) from Southern Spain, presented by Lord Lilford, F.Z.S.; three Globose Curassows (*Crax globicera*) from Central America, presented by Major F. Hime; a Lesser Sulphur-crested Cockatoo (*Cacatua tenuirostris*) from Moluccas, presented by Miss Langley; a White-tailed Gnu (*Catoblepas gnu*) from South Africa, two Mule Deer (*Cervus macrotis*) from North America, a Common Ocelot (*Felis pardalis*), a Red and Yellow Macaw (*Ara chloroptera*) from South America, deposited; a Funeral Cockatoo (*Calyptorhynchus funereus*) from New South Wales, four Common Crowned Pigeons (*Goura coronata*) from New Guinea, two Yellow-bellied Parrakeets (*Platycercus flaviventris*) from Tasmania, an American Kestrel (*Tinnunculus sparverius*) from South America, a Smooth Snake (*Coronella laevis*) from Hampshire, purchased.

ON TWO METEORS OBSERVED IN SWEDEN IN 1877¹

THE first meteor was observed over a great part of the middle of Sweden from Stockholm, in the east, to Charlottenberg (and Christiania), in the west, and from the neighbourhood of Åreskutan, in the north, to Jönköping, in the south. Accounts of the phenomenon by forty-seven different observers are given. By a comparison of a number of those observations it appears that the meteor was seen nearly simultaneously over the whole of the area where it was visible, on March 18, at 7h. 52.5m. P.M. Greenwich mean time. The phenomenon lasted only a few seconds.

When lines, showing the direction in which the meteor was seen from every separate point of observation to sink under the horizon or in which the last explosion took place, are drawn on the map, most of them meet on the Lake Vener, in the region of Vermlands Näs. The terminal point of the meteor's path was thus clearly situated above this region. Observations from Stockholm, that the meteor disappeared about half way between the moon and the horizon, and from Örebro that it split into fragments by the side of the moon, show that the last explosion took place at a height of 37 to 38 kilometres. Observations from Carlstad and Edsvala, that the meteor passed through the zenith, and from Mora, that its path was vertical, indicate a projection of its path over Mora and Carlstad, to Vermlands Näs. At first its inclination appears to have been only about 30°, but afterwards it became considerably greater. Besides the final explosion there were three other points of the meteor's path at which it threw out sparks, the first at a very considerable height—over 200 kilometres, the second at a height of 100 to 150 kilometres. These figures, for which, however, no great degree of accuracy can be claimed, are deduced from an observation made in the neighbourhood of Örebro. That the continuation of the meteor's path could not be observed from this point was probably caused by the masses of dense cloud which the meteor heaped before it in its path, and which, in the neighbourhood of the place where it fell, almost completely concealed it from view.

As is commonly the case with meteor detonations in general, the sound was propagated with excessive irregularity, violent explosions having been heard in some places, while in others close by the whole phenomenon appeared to proceed without sound.

The circumstance that in the region of Vermlands Näs, at Edsvala, Carlstad, Kinnekulle, and other places over which the meteor sprang asunder for the last time, no proper fireball was visible, but only a thrice-repeated lightning-like flash, shows that here, too, a part of the meteor's light was intercepted by the dense, cloudy masses which the meteor drove before it. A remarkable observation was made at Skinnskatteberg. There the strongly-luminous meteor projected on the snow-covered ground four or five bands of light with dark intervals, "without there being any object between the meteor and the earth to cast

a shadow," the shadow in this case having probably been caused by fragments of cloud in the neighbourhood of the meteor.

The diameter of the meteor, as calculated from a number of observations of apparent size, varied from 200 to 2,500 metres. Prof. Nordenskjöld considers it probable that the Vener meteor, in its path through the atmosphere, formed a luminous ball of 400 to 500 metres' diameter.

When the above-described phenomenon took place, the ground in the middle and north of Sweden was still covered with snow, a circumstance favourable for ascertaining whether any solid particles fell from the meteor in question in the form of meteoric dust to the surface of the earth. Prof. Nordenskjöld requested a student, Herr Svenonius, to proceed to the supposed place of fall, and to endeavour, both by his own researches and by inquiries of persons resident in the region, to discover any remains of the meteor. He travelled several times across the region, and employed a large number of people in searching on the ice on Lake Vener. The result was negative, with the exception that Herr Svenonius found on Lake Vener small quantities of a black or dark grey dust, of doubtful origin, which under the microscope appeared to consist of—

1. Small aggregates of cells derived from higher plants and isolated or coupled plant-cells.

2. A black colloid substance, which formed the main mass of the dust.

3. Inorganic particles of dust, which were *isotropical*, and could thereby be easily distinguished from grains of sand, which entered very sparingly into the mixture. The dust scarcely contained any particles that were capable of being attracted by the magnet, whereby it differed completely from the dust collected on the polar ice during the Swedish expedition of 1872-73. From the small quantity of material that could be employed for analysis, no complete chemical examination of the inorganic constituents could be carried out. The principal constituents were silica, 38 per cent., oxide of iron, 34 per cent., alumina, 8 per cent. No trace of cobalt, nickel, or phosphorus could be discovered.

The dust was found in small quantity on the borders of the small pools, which, under the influence of the spring rise of temperature, were formed everywhere on the ice of Lake Vener.

It is probable that this meteor mainly consisted partly of gaseous substances, partly of carbon, so finely divided that it was completely burned during the short path of the meteor in the atmosphere of our globe.

The second meteor was seen on April 29 at 8.37 P.M. Greenwich mean time, over the greater part of Sweden, from a point lying a little to the south-east of Gothenburg to Vittangi in the extreme north. It was also seen over a great part of Finland, and at St. Petersburg and Dorpat. Accounts from no fewer than seventy-three different places are given. The meteor had, when first observed, the appearance of a large star. Its size increased, however, at first slowly, afterwards rapidly, so that it at length gave out a light so bright that the country over which it passed was lighted up as if it had been full day. The light increased in brightness until the meteor exploded about half way between Luleå and Piteå at a height of 35 kilometres. The time that elapsed between the first appearance of the meteor and its explosion did not exceed a minute and a half. The phenomenon, however, did not come to an end then. A part of the meteor appears, after the explosion, to have continued its course, and perhaps may have passed out of the atmosphere. Besides the usual line of sparks which generally marks the path of a meteor for some moments, there occurred in this case along a considerable part of the path a splendid light phenomenon of a red colour, which, however, was only observed in regions far removed from the place of explosion. This red appearance lasted from fifteen to thirty minutes. After it ceased the path of the meteor was still marked in the heavens for a long time (upwards of an hour) as a light band of cloud, which first assumed a zigzag form and then gradually disappeared. The whole phenomenon accordingly lasted nearly two hours, and it is probable that the meteor, or parts of it, both when it first appeared as a star and after the red light ceased, shone not with its own light but with light reflected from the sun.

The statements as to the time during which the fire-ball itself was luminous in the atmosphere differ, varying from some few to ninety seconds. The latter, however, is the only one which has reference to the whole of the time during which the meteor was luminous from its first appearance as a large star to its explosion.

¹ By Prof. Nordenskjöld. Abstract of two papers in *Trans. of the Geological Society of Stockholm*, 1878, Nos. 45, 46, and 47.